Part 1: Reading Assignment. Read the following sections in the textbook. No reading questions assigned this week.

- Ch. 8: 8.3–8.5

Part 2: Normalization. Use the relation \( R(a, b, c, d, e) \) with FDs \( a \rightarrow bc, cd \rightarrow e, b \rightarrow d, e \rightarrow a \) for questions 1–5 below.

1. What are the (minimal) candidate keys for \( R \) given the FDs?

2. Which, if any, of the FDs for \( R \) are non-key, non-trivial FDs?

3. State whether each of the following are lossless decompositions with respect to the functional dependencies \( R \). Justify your answer by explaining why each is either lossless or lossy.
   
   (a). \( R_1(a, b, c) \) and \( R_2(a, d, e) \)
   
   (b). \( R_1(b, c, d) \) and \( R_2(a, e) \)
   
   (c). \( R_1(a, b) \) and \( R_2(b, d) \)
   
   (d). \( R_1(a, b) \) and \( R_2(b, c, d) \)

4. Show that the decomposition of \( R \) into \( R_1(a, b, c) \) and \( R_2(a, d, e) \) is not dependency preserving.

5. Give a lossless BCNF decomposition of \( R \). Is your decomposition dependency preserving? Explain why or why not.

6. Find a lossless BCNF decomposition of your tables from HW 1 and FDs from HW 7. Give the original tables, the FDs, and the new tables. State whether your resulting design is dependency preserving.

Turn in your answers to the above questions in class on the due date. Note that since this isn’t a programming assignment, you do not need to submit your assignment online and you do not need to include a cover sheet. However, please include an assignment reflection. Be sure your answers are readable and clearly marked.